SCIENTIFIC NOTE

Attraction of *Stoeberhinus testaceus* to Oriental Fruit Moth Pheromone

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Abstract: During pheromone-based mating disruption studies for suppression of the koa seedworm, *Cryptophlebia illepida*, and litchi fruit moth, *Cryptophlebia ombrodelta*, in macadamia nuts, it became apparent that *Stoeberhinus testaceus* Butler (Lepidoptera: Gelechiidae) responds to the same pheromone. In plots where mating disruption was being performed, *S. testaceus* was rarely caught in pheromone traps, while large numbers were caught in adjacent control plots. Response to nonspecific pheromones can result in false trail following. Production of similar pheromones is an indirect method by which an introduced species may affect the population dynamics of other species in a shared habitat.

Stoeberhinus testaceus Butler (Lepidoptera: Gelechiidae) is one of the most common moths in Hawaii and can often be collected around lights in lowland areas (Zimmerman 1978). *S. testaceus* is an immigrant species that is widespread in Oceania, but was first described from Hawaii collections. Little is known about its life history, but the larvae are known to feed in silken tunnels among decaying leaves or grasses (Zimmerman 1978).

In studies conducted on macadamia nuts for management of koa seedworm (KSW), *Cryptophlebia illepida* (Lepidoptera: Tortricidae), and litchi fruit moth (LFM), *Cryptophlebia ombrodelta*, we routinely use suspended sticky traps baited with the commercially available pheromone for the oriental fruit moth, *Grapholitha molesta* (Busck) (Lepidoptera: Tortricidae) for monitoring. It is unlikely that the oriental fruit moth pheromone (a mixture of (*Z*)-8-dodecenyl acetate (93%), (*E*)-8-dodecenyl acetate (6%), and (*Z*)-8-dodecenol (1%)) is exactly the same composition as pheromones produced by either *Cryptophlebia* species. However, both *Cryptophlebia* species respond well enough that this pheromone can be used for monitoring and potentially for mating disruption. This note reports that *S. testaceus* also appears to respond to the same pheromone.

Materials and Methods

In 1997, we were evaluating mating disruption of KSW and LFM at several locations on the island of Hawaii. We set up two 1.2 ha plots near Honomalino in a ≈1,500 ha macadamia orchard, and six 1.2 ha plots near Pahala in a 1,300 ha macadamia orchard. Half of the plots were treated with 1,000 oriental fruit moth mating disruption dispensers/ha (Biocontrol Limited, Vancouver, WA.), and the other half were left untreated. All dispensers were placed in the upper third of the tree canopy. Plots were separated by a minimum of 80 m, and new dispensers were applied after 75 d. All plots were planted at 237 trees/ha, and had similar

Table 1. Captures of male *S. testaceus* in pheromone traps baited with oriental fruit moth lures, summer 1997.

	Total no. male *S. testaceus* caught	
Location	**Treated**	**Control**
Honomalino	12	84
Pahala Plot 1	5	328
Pahala Plot 2	11	331
Pahala Plot 3	13	100
Total	41	843

(weedy) vegetation within each block in terms of density and species composition. Part of the evaluation process involved monitoring with pheromone traps in both the control and treated areas. Two pheromone traps (Trece, Inc., Salinas, CA Pherocon 1C traps) were placed in the center part of each plot, at least 5 tree rows from the borders and at least 7 tree rows from each other. The traps were baited with the oriental fruit moth lures (Trece, Inc., Salinas, CA) and changed every 2 weeks. We monitored the plots for ≈ 5 months during the growing season. If *S. testaceus* moths were responding to oriental fruit moth pheromone, we would expect that trap catches of *S. testaceus* in the treated areas would be greatly depressed by the mating disruption treatment. To test this, we subjected trap catch data to a 2-way ANOVA (SAS 1994) with location and treatment being the factors. Data were tested for normality and a natural log transformation was applied before ANOVA.

Results

When total trap catches were summed over the season, we found most of the *S. testaceous* adult males were caught in the Pahala plots (Table 1). The Honomalino area is much drier and had little grass between trees compared to the Pahala sites that typically had large amounts of guinea grass (*Panicum maximum* Jacquin) in the drive rows. At the Honomalino site, a total of 84 moths were caught in the pheromone traps in the control plot and 12 in the treated plot. At Pahala, a total of 759 individuals were caught in pheromone traps in the control plots while only 29 were caught in treated plots. Considering all locations, more than 20X more *S. testaceus* were caught in the control plots compared to the treated plots. ANOVA on the trap catch data showed that location was not significant ($F = 0.12$; $df = 2, 7$; $P = 0.89$), but that the treatment (mating disruption or control) was highly significant ($F = 35.4$; $df = 1, 7$; $P = 0.004$).

Discussion

S. testaceus responds to the commercially produced oriental fruit moth pheromone and can be caught in high numbers using this lure, but it is not a macadamia pest. However, the fact that all 3 species respond to this pheromone suggests a possible method by which

invading species (LFM, *S. testaceus*) may interact with a native species (KSW), even though they are not competing for a shared limited food resource. Although we cannot be certain that the 3 species all respond to each other's pheromone, the pheromones are probably similar in composition to oriental fruit moth pheromone. If they do respond to each other's natural pheromone (as opposed to the synthetic oriental fruit moth blend), the success of males finding conspecific females may be dramatically reduced by the mechanism of false trail following (Carde and Minks 1995). In addition, if a male finds a non-conspecific female, his interference may cause the female to stop calling, at least for a short while, and decrease her probability of mating (at least on that night). Obviously there are many possible isolating mechanisms, such as spatial and temporal partitioning (both within a day and within the season). Our studies show that *S. testaceus* was active during the same times of the season as KSW and LFM, so temporal partitioning might involve shifting the calling periods within the day. When two populations sharing a pheromone come together for the first time, it is likely the degree of interference will depend on the relative population levels of the two species, the degree of overlap in calling periods (diurnal periodicity and the synchronization of the population densities), and habitat partitioning.

References

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